Seed-mediated growth of gold nanoparticles adsorbed onto carbon felt substrate for yeast-based MFC

Duarte Kimberley, Frattini Domenico, Christwardana Marcelinus, Accardo Grazia[1], 윤성필[1], 권용재[2,†]

Seoul National University of Science and Technology; [1]한국과학기술연구원; [2]서울과학기술대학교 에너지환경대학원

(kwony@seoultech.ac.kr[†])

In this work, gold nanoparticle growth on polyethylenimine (PEI) functionalized carbon felt (CF) substrate-bound seeds, with and without a surfactant ligand aid, in aqueous solution at room temperature is explored. Rough, irregularly shaped, and wide-spread gold nanocrystals and nanoflowers structures were developed atop gold seeds on the hydrophilic CF-PEI fibres. Nanoparticle growth was performed with a gold salt reducer, nanoparticle initiator, and a strong ligand with no agitation. The dependence on growth time and amount of ligand, 4-mercaptobenzoic acid (MBA), are explored. Gold nanoparticle structures are examined through XPS, HR-SEM; attachment of yeast and microbial fuel cell (MFC) viability are explored through CV and EIS. The optimization of the redox reaction of chloroauric and L-ascorbic acid for the growth of nanoparticles through the analyses showed both favourable and unfavourable conditions for yeast biofilm inhabitancy. Results demonstrated a relationship between surface chemical compositions and effective yeast active-surface coverage on modified carbon felts.